

ET5 ELECTRICAL TESTER



Instruction Manual



GENERAL SAFETY INFORMATION: Always read before proceeding.

Warning

These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC.

This product must only be used by a competent person capable of interpreting the results under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to the Warnings, Precautions and Technical Specifications. Always check the unit is in good working order before use and that there are no signs of damage to it. Do not use if damaged.

Where applicable other safety measures such as use of protective gloves, goggles etc. should be employed.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

REMEMBER: SAFETY IS NO ACCIDENT

MEANING OF SYMBOLS:

	Equipment complies with relevant EU Directives
	End of life disposal of this equipment should be in accordance with relevant EU Directives
	Caution - risk of electric shock
	Caution - risk of danger & refer to instructions
	Equipment protected by double or reinforced insulation (Class II)
	Alternating current (AC)
	Direct current (DC)
	Earth (ground)
	Application around and removal from HAZARDOUS LIVE conductors is permitted.

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk.

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Specifications

1. INTRODUCTION

1.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor immediately.

1.2 Description

The ET5 is an electrical tester with the following functions:

- ◆ AC & DC current to 200A
- ◆ AC & DC voltage to 600V
- ◆ Resistance to 50M Ω
- ◆ Capacitance to 5mF
- ◆ Frequency to 1 MHz.
- ◆ Temperature (K type thermocouple), -35°C to 500°C
- ◆ Duty Cycle
- ◆ Continuity with audible indication
- ◆ Diode testing

Further functions are:

- ◆ Non-contact voltage indicator
- ◆ Simultaneous measurement
- ◆ Auto power off
- ◆ Display hold
- ◆ Display backlight
- ◆ Auto ranging

1.3 Accessories (included)

- ◆ TL17 test leads
- ◆ 9V battery
- ◆ K type thermocouple
- ◆ Instructions

1.4 Battery Installation

Refer to Section 4.1 (Battery Replacement) for the battery installation instructions for the ET5.

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2. PRODUCT SPECIFIC SAFETY INFORMATION

Measurement Category III (CAT III) is applicable to test and measuring equipment connected to the distribution part of the building's low-voltage MAINS installation.

2.1 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

Warnings

Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Do not use if damaged.

Do not use if the battery cover is not fitted.

Always test this unit on an appropriate proving device or known voltage source before and after using it to determine if a hazardous voltage exists in a circuit to be tested.

When positioning the fork around a hazardous live conductor always keep your fingers behind the fork finger guard.

Measuring a voltage that exceeds the specified limits of the unit may damage the unit and expose the operator to a shock hazard. Always check the unit's specified limits before use.

Before use check the test leads and any accessories for any damage. Make sure they are free from dust, grease and moisture. The test leads have contrasting outer and inner insulation, to allow damage to the test leads to be easily identified. Do not use if damaged.

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When using test leads, always keep your fingers behind the finger guards on the test lead probes.

When this unit is used in combination with test leads, the measurement category of the combination is the lower measurement category of either this unit or the test leads used. Likewise if test lead accessories such as crocodile clips are also used, the measurement category will be the lowest measurement category in that combination.

If the insulated end caps are not fitted to the TL17 test leads, the measurement category becomes CAT II 1000V, and the test leads must not be used on CAT III or CAT IV installations to avoid the risk of shorting high energy circuits and arc flash.

Test leads and any test lead accessories must be properly seated and firmly connected before use.

To avoid electrical shock, and damage to the instrument, do not use this instrument with its associated temperature probe when the voltage at the measurement surface exceeds 30V DC/AC rms.

Cautions

Avoid severe mechanical shock or vibration and extreme temperature.

To avoid burns or damage to equipment, do not take temperature measurements inside microwave ovens.

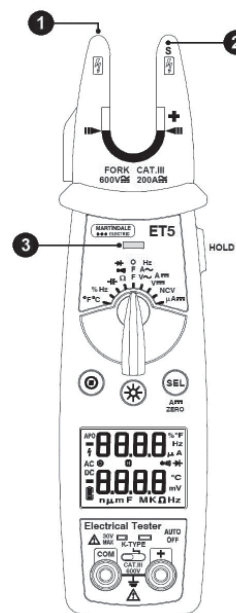
Remove the batteries when not in use for an extended period, to avoid corrosion from leaking batteries.

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3. OPERATION

3.1 General

If the magnitude of a parameter to be measured is uncertain, but known to be within the maximum safe limits of the electrical tester, manually set the range to maximum. E.g. If measuring AC voltage and the voltage magnitude is unknown, set the range to 600V, then if required select the correct range for a satisfactory reading. If the electrical tester displays **OL** or **-OL** then the measurement limits of the range have been exceeded.



- 1 LED torch
- 2 NCV sensor
- 3 High voltage/continuity LED

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3.2 Low Battery Indication

The battery capacity is shown by the symbols on the LCD.

If the symbol is flashing followed by a **LO.Bt** display, the battery needs replacing as measurement accuracy can no longer be guaranteed (See section 4.1 Battery Replacement).

3.3 High Voltage / Continuity LED

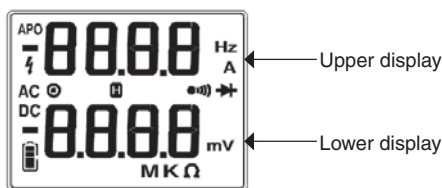
The LED will flash red when the voltage being measured is $\geq 30V$ DC/AC rms, or the presence of a live voltage is detected when the NCV function is selected. The buzzer will also sound.

The LED will illuminate green when the resistance being measured is $< 30\Omega$ when the continuity function is selected.

3.4 Description of Press Buttons

- Selects manual ranging
- Turns on/off the backlight and LED torch
- SEL/** **ZERO** Selects alternate or additional functions
Zeroes the DC 200A range
- HOLD** Selects display hold

3.5 Description of LCD Symbols



- APO** Auto power off is activated
- Flashes to indicate the presence of $>30V$ AC/DC
- AC** Indicates AC measurement

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- DC** Indicates DC measurement
- Manual ranging is selected
- Display hold is activated
- Continuity function is selected
- Diode testing function is selected
- Indicates battery level
- %, °F, Hz** Units of measurement being displayed (Upper display)
- μA, A** Units of measurement being displayed (Lower display)
- °C, mV, V, μF, mF, Ω, kΩ, MΩ, Hz**

3.6 Auto Power Off

If the electrical tester is inactive for a period of 30 minutes it will automatically power off.

If any button is pressed after the electrical tester has automatically powered off, it will turn back on.

To disable the auto power off function hold the button at the same time as turning the rotary switch from **OFF** to any position. The **APO** symbol will no longer be displayed on the LCD.

3.7 Auto/Manual Ranging

The DC voltage, resistance and capacitance functions have auto ranging capability and will default to auto ranging when selected.

To select manual ranging, press the button. The symbol will be displayed to signify manual ranging is selected.

To manually select a range when in manual mode press the button until the required range is selected.

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To exit manual ranging, hold down the button for 2 seconds. The symbol will no longer be displayed.

3.8 Display Hold

To hold a displayed value, press the **HOLD** button. The LCD will display .

To exit display hold, press the **HOLD** button again.

3.9 Backlight/LED Torch

To switch on the backlight and LED torch press the button. Press again to turn the backlight and LED torch off.

Automatic turn off is after approx. 1 minute.

The LED torch is positioned in the tip of the left hand fork.

3.10 Simultaneous Measurement of Voltage and Current

The upper and lower displays of the LCD allow measurements of different parameters to be made simultaneously.

When the rotary switch is set to the position either AC voltage and AC current or AC voltage and the frequency of the AC current can be measured simultaneously.

When the rotary switch is set to the position DC voltage and DC current can be measured simultaneously.

3.11 Use of TL17 Test Leads

Where access to test points may require extended probe tips, the insulated probe tip covers may be removed by gently pulling them forward until they unclip from the probe body.

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CAT III 1000V CAT IV 600V



CAT II 1000V ONLY,
DO NOT USE on CAT III
or CAT IV installations

One test lead may be attached to the side of the electrical tester for ease of use when making measurements.



3.12 AC Voltage Measurement

Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

Set the rotary switch to the position.

The AC voltage function is manual ranging only, and defaults to the 500V range when this function is selected.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured voltage from the lower display.

3.13 DC Voltage Measurement

Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

Set the rotary switch to the position.

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The AC voltage function defaults to auto ranging and the 5V range. If the 500mV range is required it is manually selected.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured voltage from the lower display.

3.14 AC Current Measurement

Set the rotary switch to the $\overset{Hz}{\sim}$ position and press the **SEL** button to activate the upper display.

Taking all necessary safety precautions position the fork of the electrical tester around the conductor to be tested so the centre of the conductor aligns with and is central to the $\blacktriangleright\blacktriangleleft$ marks on the fork.

Read the measured AC current from the upper display.

If required press the **SEL** button once more to measure the frequency of the AC current. The frequency value is displayed on the upper display.

Pressing the **SEL** button again will return the upper display to the ac current measurement.

3.15 DC Current Measurement (200A range)

Set the rotary switch to the $\overset{A}{\text{---}}$ position and press the **SEL** button to activate the upper display.

If required remove any zero offset by pressing the $\overset{A}{\text{ZERO}}$ button.

Taking all necessary safety precautions position the fork of the electrical tester around the conductor to be tested so the

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centre of the conductor aligns with and is central to the $\blacktriangleright\blacktriangleleft$ marks on the fork.

Read the measured DC current from the upper display.

3.16 DC Current Measurement (500 μ A range)

Connect the black test lead to the **COM** terminal and the red test lead to the \oplus terminal.

Set the rotary switch to the $\mu A \text{ ---}$ position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured current from the upper display.


3.17 Resistance Measurement

Connect the black test lead to the **COM** terminal and the red test lead to the \oplus terminal.

Set the rotary switch to the $\overset{\Omega}{\text{---}}$ position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured resistance from the lower display.

3.18 Capacitance Measurement

 Be sure the capacitor being tested is completely discharged before connecting the test leads.

Connect the black test lead to the **COM** terminal and the red test lead to the \oplus terminal.

Set the rotary switch to the $\text{---} \text{ } \overline{\text{---}}$ position.

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Taking all necessary safety precautions, and observing the correct polarity for electrolytic capacitors, connect the test probes to the capacitor to be measured.

If the capacitor being measured is charged, **diS.C** will be displayed on the LCD.

Read the measured capacitance from the lower display.

3.19 Frequency & Duty Cycle Measurement

Connect the black test lead to the **COM** terminal and the red test lead to the \oplus terminal.

Set the rotary switch to the % Hz position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured frequency from the lower display and the measured duty cycle from the upper display.

3.20 Temperature Measurement

Set the rotary switch to the $^{\circ}F \text{ } ^{\circ}C$ position and set the **TEMP** switch to the **TEMP** position.

Connect a K-type thermocouple probe, suitable for the type of temperature measurement and temperature range being made, to the **K-TYPE** sockets.

Taking all necessary safety precautions position the thermocouple at the surface or in the medium to be measured and read the measured temperature from the display.

The temperature will be displayed in $^{\circ}C$ on the lower display and $^{\circ}F$ on the upper.

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3.21 Temperature Offset Adjustment

The offset adjustment allows an individual Type K thermocouple to be optimised for the best measurement accuracy at a chosen reference temperature.

The adjustment is accessed by removing the battery cover (see 4.1).

Connect the thermocouple to the input socket and place the thermocouple in a known, stable temperature environment at the reference temperature and allow the readings to stabilize.

Slowly adjust the **TEMP OFFSET** until the electrical tester reading matches the temperature of the known environment.

Leave sufficient time between adjustments to allow for measurement lag.

The calibration of the thermometer-thermocouple combination is now optimized for measurements at the reference temperature.

3.22 Continuity Testing

Connect the black test lead to the **COM** terminal and the red test lead to the \oplus terminal.

Set the rotary switch to the $\overset{\Omega}{\text{---}}$ position.

Press the **SEL** button once to select the continuity function. The LCD will display $\ast \text{---} \ast$.

Taking all necessary safety precautions connect the test leads to the circuit being tested.

If the resistance is $<30\Omega$, the buzzer will sound continuously and the green LED will illuminate. The resistance value will be displayed if $<500\Omega$.

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3.23 Diode Testing

If the diode to be tested is in circuit be sure the circuit power is switched off.

Connect the black test lead to the **COM** terminal and the red test lead to the **+** terminal.

Set the rotary switch to the Ω position.

Press the **SEL** button twice to select the diode test function. The LCD will display \rightarrow .

Taking all necessary safety precautions connect the test leads to the diode being tested.

If the diode is good a forward bias will give a display reading of around 0.6V (silicon diode) and a reverse bias will give a display of **OL**. If the diode is shorted or open circuit the display will indicate approx. 0V or **OL** respectively for both forward and reverse bias.

3.24 Use as a Non-contact Voltage Detector

Warning

Non-contact voltage detector testing is **not** suitable to determine if a circuit is **not** hazardous live. A double pole contact voltage test should always be used for that purpose.

Before and after each use, the non-contact voltage detector function must be proven using a known good voltage source. **Do not use** if the unit fails to operate correctly during proving.

Set the rotary switch to the **NCV** position. The LCD will display **EF**.

Position the fork tip marked **S** toward the conductor to be tested for the presence of a live voltage.

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As the source of a live voltage is approached the buzzer will sound intermittently, the red LED will flash and “-” will be displayed on the upper display.

Depending on the voltage level, the closer the proximity of the unit to the voltage source, the more rapidly the buzzer sounds and the red LED illuminates, until both become continuous. The display will change from “-” to “- - -” one step at a time.

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4. MAINTENANCE

4.1 Battery Replacement

 To avoid shock or injury, disconnect the electrical tester from any external circuits and remove the test leads before proceeding.

The battery compartment is underneath the unit.


To gain access, undo the 2 screws securing the battery compartment cover, then lift off the cover.

Fit a new 9V, PP3 alkaline battery (IEC 6LR61, NEDA 1604A).

Replace the battery cover and the 2 screws.

4.2 Test Lead Replacement

If the test leads become damaged they should be replaced.

 The replacement test leads must have the same (or better) overvoltage category rating as the TL17 leads supplied.

4.3 Calibration

To maintain the integrity of measurements made using your instrument, Martindale Electric recommends that it is returned at least once a year to an approved Calibration Laboratory for recalibration and certification.

Martindale Electric is pleased to offer you this service. Please contact our Service Department for details.

Email: service@martindale-electric.co.uk

Tel: 01923 650660

4.4 Cleaning

The unit may be cleaned using a soft dry cloth. Do not use moisture, abrasives, solvents, or detergents, which can be conductive.

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4.5 Repair & Service

There are no user serviceable parts in this unit other than those that may be described in section 4. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the:

- unit
- battery
- leads
- poor connections

4.6 Storage Conditions

The instrument should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

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5. WARRANTY AND LIMITATION OF LIABILITY

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale’s opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale’s warranty obligation is limited, at Martindale’s option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer’s sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect

the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.



Specification
ET5
Electrical Tester



ELECTRICAL

All specified accuracies are at 23°C ± 5°C, <75% RH for 1 year.
Temperature Coefficient: < 0.1 x (specified accuracy) per °C. (0°C to 18°C, 28°C to 40°C)

DC Voltage

Range	Resolution	Input Impedance	Accuracy
500mV	0.1mV	1.1MΩ	± (0.5% of rdg + 2 dgts)
5V	0.001V	1MΩ	
50V	0.01V		
500V	0.1V		
600V	1V		

Overload Protection: 600V DC or AC rms

AC Voltage

Range	Resolution	Input Impedance	Accuracy
500mV	0.1mV	1 MΩ	Not specified
5V	0.001V		50-60Hz ± (1.2% of rdg + 5 dgts) 60-500Hz ± (2.0% of rdg + 5 dgts)
50V	0.01V		
500V	0.1V		
600V	1V		

Overload Protection: 600V DC or AC rms

DC Current (A --- function)

Range	Resolution	Accuracy
200A	0.1A	± (2.0% of rdg + 5 dgts)

Maximum input current: 200A

DC Current (μA --- function)

Range	Resolution	Voltage burden	Accuracy
500μA	0.1μA	1V	± (1.0% of rdg + 2 dgts)

Maximum input current: 200A

AC Current

Range	Resolution	Accuracy (50 Hz to 60 Hz)
200A	0.1A	± (2.0% of rdg + 10 dgts)

Maximum input current: 200A

Resistance

Range	Resolution	Open circuit voltage	Accuracy
500Ω	0.1Ω	-3.2V DC	± (1.0% of rdg + 5 dgts)
5kΩ	0.001kΩ		
50kΩ	0.01kΩ	-1.1V DC approx	
500kΩ	0.1kΩ		
5MΩ	0.001MΩ		
50MΩ	0.1MΩ		± (3.0% of rdg + 5 dgts)

Overload Protection: 600V DC or AC rms

Capacitance

Range	Resolution	Accuracy
5µF	0.001µF	± (3.0% of rdg + 15 dgts)
50µF	0.01µF	± (3.0% of rdg + 5 dgts)
500µF	0.1µF	± (3.0% of rdg + 5 dgts)
5mF	0.001mF	± (5.0% of rdg + 20 dgts)

Overload Protection: 600V DC or AC rms.

Temperature

Range	Resolution	Accuracy
-35°C to 0°C	0.1°C	± (2.0% of rdg + 3°C)
0°C to 300°C		± (1.0% of rdg + 1°C)
300°C to 500°C		± (2.0% of rdg + 3°C)
-30°F to 32°F	0.1°F	± (2.0% of rdg + 6°F)
32°F to 572°F		± (1.0% of rdg + 2°F)
572°F to 932°F		± (2.0% of rdg + 6°F)

Overload Protection: 30V DC or AC rms.

Frequency

Frequency measurement using AC current range

Range	Resolution	Accuracy
30Hz to 400Hz	0.1Hz	± (0.1% of rdg + 5 dgts)

Input sensitivity > 10A AC rms.

Maximum input current: 200A AC rms

Frequency measurement using Hz/% ranges.

Range	Resolution	Accuracy
500Hz	0.1Hz	± (0.1% of rdg + 5 dgts)
5kHz	0.001kHz	
50kHz	0.01kHz	
500kHz	0.1kHz	
1MHz	0.001MHz	

Sensitivity (10Hz to 1MHz): >3.5V AC rms.

Minimum pulse width: >1µs.

Duty cycle limits: >30% and <70%.

Overload protection: 600V DC or AC rms.

Duty Cycle

Range	Frequency Range	Resolution	Pulse Width	Accuracy (5V Logic)
5% to 95%	40Hz to 20kHz	0.1%	>10 us	±(2.0% rdg + 10 dgts)

Overload protection: 600VDC or AC rms.

Continuity

Range	Resolution	Response time	Accuracy
500Ω	0.1Ω	100ms	<30Ω

Overload protection: 600V DC or AC rms

Diode Test

Range	Resolution	Test current	Open circuit voltage	Accuracy
2V	1mV	0.8mA approx.	3.2V DC approx.	± (1.5% rdg + 5 dgts)

Overload protection: 600V DC or AC rms

Non-Contact Voltage Indicator

Range: 70V to 600V (50Hz to 60Hz)



GENERAL

Display: Liquid crystal display with a maximum reading of 5000 digits, dual display

Polarity: Automatic, positive implied, '-' for negative polarity indication.

Overrange: (OL) or (-OL) is displayed

Zero: Automatic

Low battery indication: The battery capacity is shown by the  symbols on the LCD. If the  symbol is flashing followed by a LO.Bt display, the battery needs replacing as measurement accuracy can no longer be guaranteed

Measurement rate: 3.3 times per second, nominal

Auto power off: After approx. 30 minutes

Power: 9V, PP3 alkaline battery (IEC 6LR61, NEDA 1604A).

Battery life: 50 hours typical with carbon zinc
100 hours typical with alkaline

Fork maximum conductor size: 15mm diameter

Dimensions: 202.5mm (L) x 51mm (W) x 44mm (D)

Weight: Approx. 200g including battery

Includes: TL17 test leads, 9V battery, K type thermocouple and instructions

ENVIRONMENTAL

Operating environment: 0°C to 40°C, <70% RH

Storage temperature: -20°C to 60°C, 0 to 80% RH

Altitude: Up to 2000m.

SAFETY

Conforms to BS EN 61010-1, BS EN 61010-2-032, CAT III 600V

Class II, Double Insulation

Pollution Degree: 2, indoor use

EMC

Conforms to BS EN 61326-1.

TL17 TEST LEADS SPECIFICATION

Maximum voltage: 1000V AC/DC

Maximum current: 10A continuous

Connectors: 4mm banana plugs

Conforms to BS EN 61010-031

Insulated end cap fitted: CAT IV 600V, CAT III 1000V, 10A

Insulated end cap removed: CAT II 1000V, 10A.

Class II, Double Insulation

Pollution degree 2

Check out what else you can get from Martindale:

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- Digital Multimeters
- Labels
- Microwave Leakage Detectors
- Motor Maintenance Equipment
- Multifunction Testers
- Non-trip Loop Testers
- Pat Testers & Accessories
- Phase Rotation Testers
- Proving Units
- Socket Testers
- Thermometers & Probes
- Test Leads
- Voltage Indicators
- Specialist Metrohm Testers (4 & 5kV)
- Specialist Drummond Testers



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